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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/808,427	03/15/2001	Soichi Oikawa	P 279213 T7KK-00S1393-1	3457

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EXAMINER

UHLIR, NIKOLAS J

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 05/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/808,427

Applicant(s)

OIKAWA ET AL.

Examiner

Nikolas J. Uhlir

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31, 37 and 40 is/are pending in the application.
- 4a) Of the above claim(s) 1-23 and 32-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) none is/are allowed.
- 6) ☒ Claim(s) 24-31, 37 and 40 is/are rejected.
- 7) ☐ Claim(s) none is/are objected to.
- 8) ☐ Claim(s) none are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

1. This office action is in response to the amendment/arguments dated 3/12/03. Claims 38-39 have been cancelled, claims 1-37 and 40 are pending, and claims 1-23 and 32-36 are withdrawn from consideration. The applicant's amendments have overcome the prior 35 U.S.C 112 rejections. Accordingly, these rejections are hereby withdrawn. Further, applicants amendment to require a more specific layer structure has overcome the prior 35 U.S.C 102(b) rejection of claims 24-27 and 37-38 over Honda et al. Accordingly, this rejection is hereby withdrawn. However, after careful consideration and close reexamination of the applied prior art, the examiner does not find the applicants arguments and/or amendments sufficient to overcome the prior applied 35 U.S.C 103(a) rejections. A clear discussion of the examiners reasoning is found in the section below entitled, "Response To Arguments."

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 40 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 40 recites the limitation "said titanium alloy" in the 2nd line of the claim. There is insufficient antecedent basis for this limitation in the claim. Correction is required. Claim 40 is dependent on claim 26, which only provides antecedent basis for a titanium chromium alloy.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 24-27, 29-31 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto et al. (US6183893) in view of Honda et al. (US5851643)

6. The limitations of claim 24 require a magnetic recording medium comprising a non-magnetic substrate, a first underlayer containing titanium formed on the non-magnetic substrate, a second underlayer formed in contact with the 1st underlayer and containing ruthenium, and a magnetic recording layer formed in contact with the 2nd underlayer and containing cobalt.

7. With respect to these limitations, Futamoto et al. teaches a magnetic recording medium that comprises a non-magnetic substrate 41 (equivalent to applicants claimed non-magnetic substrate), a 1st underlayer 42 (equivalent to applicants claimed 1st underlayer), a second underlayer 43 (equivalent to applicants 2nd underlayer), a lower perpendicular magnetic layer 44, an interlayer 45, and an upper perpendicular magnetic layer 46 (column 10, line 66-column 1, line 12 and figure 4). The 1st underlayer is formed of either Ti or Ru (column 9, lines 16-26). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize Ti to form the 1st underlayer due to the teaching in Futamoto et al. of the equivalence of Ti and Ru

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as suitable materials for forming the first underlayer. The second underlayer is made of a non-magnetic material having a hexagonal close packed structure, or a weak magnetic material having a hexagonal close packed structure. Futamoto et al. teaches that Co based materials having a HCP structure are suitable for this purpose (column 9, lines 27-35)

8. Futamoto et al. does not teach a second underlayer that contains ruthenium, as required by claim 24.

9. However, Honda et al. teaches a magnetic recording medium that utilizes an HCP underlayer. Honda et al. teaches that suitable materials for forming the HCP underlayer include Ru and Co-based materials with an HCP structure (column 17, lines 20-35).

10. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Ru as taught by Honda et al. as the material for the second underlayer taught by Futamoto et al.

11. One would have been motivated to make such a modification due to the teaching in Honda et al. of the equivalence of Ru to Co-based underlayers (having an HCP structure) as suitable materials for forming an HCP underlayer in a magnetic recording medium. One would have further been motivated to make this modification due to the teaching in Futamoto et al. that the second underlayer is made of a non-magnetic material having a hexagonal close packed structure, and the fact that Ru is known to be both non-magnetic and have an HCP crystal structure.

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12. Regarding the limitations of claims 25 and 26, wherein the applicant requires the first underlayer to be selected from the group consisting of a nitride of titanium, a titanium chromium alloy, or elemental titanium. These limitations are met as set forth above for claim 24.

13. Regarding the limitations of claim 27, wherein the applicant requires the magnetic recording layer to further contain at least one element selected from Cr and Pt. Futamoto et al. teaches in every example presented that utilizes two magnetic layers that both of the magnetic layers comprise at least Co and Cr (see columns 13-17, examples 2 and 4). Thus, the limitations of claim 27 are met.

14. Regarding the limitations of claim 29, wherein the applicant requires the magnetic recording layer to have a multilayer structure prepared by alternately forming a ferromagnetic layer containing cobalt and a non-magnetic layer containing one element selected from the groups consisting of platinum, palladium, and ruthenium. Futamoto et al. teaches that the intermediate layer is formed so as to reduce the noise of the magnetic layers (column 10, lines 15-27). The only example of a material suitable for the intermediate layer given by Futamoto et al. is in example 2, wherein a CoRu film is utilized for this purpose. Thus, the limitations of claim 29 are met, as the intermediate layer of Futamoto et al contains Ru.

15. Regarding the limitations of claims 30 and 31, wherein the applicant requires a soft magnetic layer to be present between the substrate and the 1st underlayer (claim 30), wherein the soft magnetic layer is selected from the group consisting of an FeAlSi

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series alloy, an FeTaC series alloy, an FeZrN series alloy, a CoZrNb series alloy, and an FeC series alloy.

16. Futamoto et al. does not teach a soft magnetic layer between the substrate and the first magnetic layer as required by claim 30, wherein the soft magnetic alloy has one of the compositions required by claim 31.

17. However, Honda et al. teaches a magnetic recording medium comprising a substrate 21, a soft magnetic layer 49, a structural control underlayer 22, and a multilayer magnetic film (Figure 13). The soft magnetic layer can be formed from amorphous soft magnetic materials such as Sendust, which is a known alloy of Fe, Si, and Al. A recording media utilizing this structure exhibits high-read-back output and low noise (column 23, lines 50-67).

18. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to utilize a soft magnetic underlayer such as Sendust, as taught by Honda et al. between the non-magnetic substrate and the 1st underlayer of the magnetic recording material taught by Futamoto et al.

19. One would have been motivated to make this modification due to the teaching in Honda et al. that magnetic recording media utilizing a soft magnetic layer between the substrate and an underlayer exhibit high-read-back output and low noise, and that Sendust (a known FeSiAl alloy) is a suitable soft magnetic material for such this purpose. One would have been further motivated to make this modification due to the fact that Futamoto et al. is concerned with obtaining a recording media that has low noise (column 10, lines 15-27 of Futamoto et al.).

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20. Regarding the limitations of claim 40, wherein the applicant requires the Ti alloy to contain not more than 10% Cr. The examiner notes that the requirement that the Ti alloy contain "not more than" 10% Cr allows for a layer of Ti that contains 0% Chromium. Thus, the limitations of claim 40 are met as set forth above for claim 26, as Futamoto clearly teaches that elemental titanium can make up the first underlayer, and thus contains 0% chromium.

21. Claims 28 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto et al. as modified by Honda et al. as applied to claims 24 and 27 above, and further in view of Suzuki et al.

22. Futamoto et al. as modified by Honda et al. does not teach a magnetic recording medium that includes at least two magnetic layers, wherein the magnetic layers comprise Co, Pt and O, as required by claims 28 and 37

23. The limitations of claim 37 that are directed towards the non-magnetic substrate and the structure of the magnetic layer (alternating magnetic layer and non-magnetic layer) are met as set forth above for claim 29.

24. It should be noted that Futamoto et al. teaches a specific example in which a CoCrPt alloy is used to form the 1st and 2nd magnetic layers (column 13, example 2). In light of this fact, the examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a CoCrPt alloy to form the 1st and 2nd magnetic layers of Futamoto et al., as this alloy is clearly shown to be suitable for this purpose by example 2

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25. Further, with respect to the requirement in claims 28 and 37 that the magnetic layers contain both Pt and O, Suzuki et al. teaches that the noise of a magnetic layer can be reduced by incorporating 0.1-15% of oxygen into the magnetic layer (column 3, line 66-column 4, line 5).

26. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to incorporate oxygen as taught by Suzuki et al. into the magnetic layers taught by Futamoto et al. as modified by Honda et al.

27. One would have been motivated to make this modification due to the teaching in Suzuki et al. that media noise is reduced by incorporating oxygen into a magnetic layer, and because Futamoto et al. is concerned with obtaining a recording media that exhibits low noise.

28. Thus, the limitations of claims 28 and 37 are met when oxygen is added to the CoCrPt alloys taught by Futamoto et al. as modified by Honda et al.

Response to Arguments

29. Applicants arguments dated 3/12/03 have been carefully considered but are not persuasive. The examiner has withdrawn the prior 102(b) rejection over Honda et al in light of applicant's amendment to require a more specific layer structure in all of the independent claims. Thus, the applicants arguments with respect to this rejection are superfluous as they are directed towards a rejection that is no longer applied.

Accordingly, these arguments are not addressed by the examiner in this section.

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30. In regards to the 35 U.S.C rejection of all of the instant claims over Futamoto in view of Honda and Futamoto in view of Honda further in view of Suzuki, the applicant presented the following arguments (summarized):

- The claims are not rendered unpatentable by Futamoto as modified by Honda. Futamoto requires the difference in lattice constant between the magnetic layer and the second underlayer to be less than 5%. The lattice constants of Ru and Co are 2.71Å and 2.51 Å respectively, thus resulting in a difference in lattice constant of 7.4%. Since this lattice constant is greater than 5%, the ruthenium layer disclosed in Honda is not applicable for use as the second underlayer in Futamoto.
- The claims are not rendered unpatentable by Futamoto as modified by Honda and further in view of Suzuki. Suzuki is directed towards a longitudinal recording medium, whereas the inventions disclosed by Futamoto or Honda are drawn towards perpendicular media. Perpendicular media are completely different then longitudinal media, thus it is not possible to substitute the longitudinal media of Suzuki into the invention of Futamoto or Honda.

31. These arguments are not persuasive. Regarding the applicant's arguments relating to the difference between the lattice constants of Co and Ru. The examiner does not refute the applicants showing of how the Co and Ru differ in lattice constant by >5%. However, it is respectfully pointed out that the magnetic layer of Futamoto is a **Co alloy** (column 9, lines 45-60), **not pure Co**. The addition of alloying elements into a Co layer will necessarily change the lattice parameter, unless an alloying element having an identical lattice parameter to that of Co is utilized. In at least one example, Futamoto utilizes a CoCrPt alloy to form the magnetic layers. It is known in the art of magnetic recording media that Pt is added to Co alloys to **expand the atomic spacing** (i.e lattice parameter) of the alloy (as shown by US#5693426 to Lee et al., Column 6, lines 34-55). The applicants showing is certainly valid for a magnetic layer that is pure Co. However, the applicant has not shown that the lattice parameters of Ru would differ >5% from the lattice parameters of a Co alloy, in particular a CoCrPt alloy. Furthermore, even if the applicant were to provide such a showing, the examiner feels that it would have been

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obvious to one of ordinary skill in the art at the time the invention was made to adjust the composition of the magnetic alloy to achieve the desired lattice matching between the magnetic layer and the Ru underlayer, as it is known in the art that good lattice matching is desirable (as shown by Futamoto) and that the lattice structure of a magnetic alloy can be adjusted by adjusting the composition of its constituent elements (as shown by Lee).

32. Regarding applicant's argument that the magnetic layer of Suzuki could not be used to replace the magnetic layers of Futamoto or Honda, because Futamoto and Honda are directed towards perpendicular recording layers, whereas Suzuki is drawn towards a longitudinal recording layer. This argument is not persuasive. The examiner agrees that longitudinal and perpendicular recording media are innately different and are generally not interchangeable. However, the examiner in this or the prior office action never argued that it would have been obvious to **substitute** the magnetic layer of Suzuki for the magnetic layers of Futamoto as modified by Honda. Rather the examiner has argued that it would have been obvious to one of ordinary skill in the art to add oxygen to the CoCrPt magnetic layers disclosed by Futamoto as modified by Honda, in light of the showing in Suzuki that the size of the grains in a magnetic recording layer are reduced by the incorporation of oxygen into the layer, thus reducing the noise of the layer.

33. The examiner notes that to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary

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skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

34. In the instant case, the motivation behind the combination of Futamoto as modified by Honda with Suzuki is the teaching in Suzuki that incorporating oxygen into the layer can reduce the noise of a magnetic layer. The examiner feels that although the ultimate end uses of Suzuki are different than that of either Honda or Futamoto, one of ordinary skill in the art would have had a reasonable expectation of success in expecting that by incorporating oxygen into the magnetic layers of Futamoto or Honda would result in a reduction in the noise of these magnetic layers, as the reduction in noise is attributed by Suzuki to be a result of the thickening of grain boundaries and the corresponding reduction in magnetic interaction between grains (see Suzuki, column 4, lines 1-5). This phenomenon is independent of the end use of the magnetic layer, and would be expected to occur in a magnetic alloy regardless of that alloys magnetic orientation. Last, the combination of these three patents teaches all of the applicants claimed limitations. Thus, as the examiner has met all of the requirements to establish a prima facie case of obviousness and the applicant's arguments are directed towards an argument that was never presented by the examiner, the examiner finds the applicants arguments unpersuasive.

Conclusion

35. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.

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April 30, 2003



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700